

## REMARKS

In the foregoing amendments, claims 1-9 were canceled, and new claims 10-15 were added to the application. The new claims include subject matter set forth in the previously presented claims. The new claims are believed to define patentable subject matter along the lines identified in the Official action mailed April 28, 2003. In particular, the Official action mailed April 28, 2003, objected to then presented claim 9 as being dependent upon a rejected base claim, but stated this claim was allowable if rewritten in independent form

---

including all of the limitations of the base claim and any intervening claims.

The Official action stated that none of the cited or prior art shows or fairly suggest the feature of an integrated stem and disk structure where each of the stem and disk are made of a uniform structure of a silicon nitride material, as required by previously presented claim 9.

In the foregoing amendments, the patentable subject matter of previously presented claim 9 was included in all of the claims. For example, independent claim 10 defines a disk and a stem supporting the disk, where the disk and stem have a uniform integral structure. This same limitation appears in independent claims 12 and 15. For the reasons set forth in the Office action mailed April 28, 2003, applicant respectfully submits that new claims 10-15 define patentable subject matter. Therefore, a formal allowance of these claims is respectfully requested.

The Official action set forth a rejection of claims 1, 2, 5, 6, and 8 under 35 U.S.C. § 102(b) as being anticipated by either U.S. Patent No. 4,374,074 of Ueda *et al.* (Ueda '074) or U.S. Patent No. 4,315,720 of Ueda *et al.* (Ueda '720). This rejection is set forth at the bottom of page 2 of the Official action. The disclosures in Ueda '074 and Ueda '720 are identical and hereinafter they will be referred to collectively as the Ueda patents. Claim 7 was rejected over the Ueda patents in view of U.S. patent No. 5,814,573 of Hogg. The teachings of Hogg were cited as teaching  $\beta$ -sialon type silicon nitride materials.

---

Applicant respectfully submits that the teachings of the Ueda patents and/or Hogg do not disclose or suggest the invention as set forth in claims 10-15 within the meaning of 35 U.S.C. § 102(b) or 35 U.S.C. § 103.

The uniform integral disk and stem structure of applicant's claims has many advantages. It prevents solidification of a molten material on a rotating disk, it permits very high speed rotation of the rotation disk, and it enables the fabrication of small size powders effectively. In order to obtain these advantages of the presently claimed invention, the present inventor discovered that it is necessary to lighten the rotating disk. In the prior art, in order to retain high strength necessary to withstand thermal shock (thermal stress) and high speed rotation, composite structures, such as those proposed in the Ueda patents, were used. In contrast thereto, the presently claimed invention uses a rotating disk and stem made of silicon nitride or a material containing silicon nitride within a uniform integral structure, such as shown in Fig. 4A. This

structure provides a lightweight device that can withstand thermal shock (thermal stress). A reason for this is that the material has both low thermal expansion coefficient and high strength.

A rotating disk having a uniform structure that is also lightweight, as presently claimed, can be rotated at a rate of 60,000 rpm or more. This enables production of powders smaller than 30  $\mu\text{m}$ . However, structures having a disk and disk holder, such as those set forth in Comparative Example 7-10 as shown in Fig. 4B, result in a heavy disk making it difficult to rotate at a high speed. When a disk such as proposed in Comparative Example 7-10 is used, the disk is necessarily large, so that a molten material easily solidifies thereon and effective fabrication cannot be attained.

The teachings of the Ueda patents propose a disk is made of boron nitride that is fixed in a holder, which is a large structure. Accordingly, a disk such as proposed by the Ueda patents can be rotated at most about 10,000 rpm. As a result, only powders with a size of 0.2mm (200 $\mu\text{m}$ ) can be fabricated, in contrast to the powders of smaller than 30  $\mu\text{m}$  that can be produced the disk and stem of applicant's claim.

The teachings of the Ueda patents do not contemplate or suggest a rotating disk having a uniform structure made of silicon nitride or a material containing silicon nitride for scattering the poured molten metal, as required in present claims or the advantages achieved by such a disk in an apparatus for fabricating a thermoelectric material comprising, as described above. The

teachings of Hogg do not cure or rectify the aforesaid deficiencies in the teachings of the Ueda patents. Therefore, applicant respectfully submits that the presently claimed invention is patently distinguishable from these teachings.

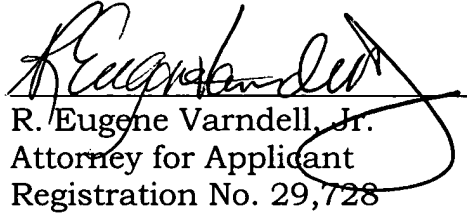
For the foregoing reasons, applicant respectfully submits that the invention set forth in claims 10-15 is patently distinguishable from the teachings of the Ueda patents alone or together with Hogg within meaning of 35 U.S.C. § 102 or 35 U.S.C. § 103. Therefore, applicant respectfully requests that the examiner reconsider and withdraw these rejections.

---

In view of the foregoing amendments and remarks, favorable consideration and a formal allowance of claims 10-15 are respectfully requested. While it is believed that the present response places the application in condition for allowance, should the examiner have any comments or questions, it is respectfully requested that the undersigned be telephoned at the below listed number to resolved any outstanding issues.

In the event this paper is not timely filed, applicant hereby petitions for an appropriate extension of time. The fee therefor, as well as any other fees which may become due, may be charged to our deposit account No. 22-0256.

Respectfully submitted,  
VARNDELL & VARNDELL, PLLC



R. Eugene Varndell, Jr.  
Attorney for Applicant  
Registration No. 29,728

Atty. Case No. VX012340  
106-A S. Columbus Street  
Alexandria, Virginia 22314  
(703) 683-9730

V:\Vdocs\W\_Docs\July03\P0-152-2340 RS.doc